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# בקשה לפטנט

100/00696 Application for Patent

אני, (שם המבקש, מענו – ולגבי גוף מאוגד – מקום התאגדותו)
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(בעברית) (Hebrew) צעצועים איטרקטיווים

(באנגלית) (English) INTERACTIVE TOYS

מבקש בזאת כי ינתן לי עליה פטנט
hereby apply for a patent to be granted to me in respect thereof.

| • בקשת חלוקה – Application of Division | • בקשת פטנט מוסף – Application for Patent Addition | • דרישה דין קדימה Priority Claim | | |
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| מבקשת פטנט from Application | • לבקשה/לפטנט to Patent/Appl. | מספר/סימן Number/Mark | תאריך Date | מדינת האגוד Convention Country |
| No. _____ מס' | No. _____ מס' | PCT/IL98/00450 | 16 ספטמבר 1998 | PCT |
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צעצועים אינטרקטיווים

# INTERACTIVE TOYS

טוי קונטרול בע"מ

TOY CONTROL Ltd.

e:100/00696

# INTERACTIVE TOYS

## FIELD OF INVENTION

The present invention relates generally to toys that interact among themselves, especially using acoustic transmissions.

## BACKGROUND OF THE INVENTION

US patents 5,191,615 and 4,840,602 describe toys that respond to signals transmitted from a different location. In one example, the signals are RF signals. In another example the signals are encoded light modulations which are carried as part of a TV transmission or as part of a video recording. The disclosures of all the patents and publications mentioned herein are incorporated herein by reference.

US patent number 5,752,880 and a corresponding PCT publication describe toys having a two way communication link with a computer. This link may be used to provide instructions and also to download programming to the toy.

US patent 5,655,945 describes a set of one or more toys that are controlled by a RF signal transmission. The signal is decoded from a vertical blank period signal of a children's movies and the actions of one or more toys (sounds, motion), are synchronized with the movie using the transmission.

However, a child often plays with a plurality of toys and simulates interaction between them.

## SUMMARY OF THE INVENTION

One object of some preferred embodiments of the invention is to provide toys which interact directly with each other, preferably enhancing the pleasure of a child playing with the toys. In a preferred embodiment of the invention, the toys comprise action figures, animal figures and/or dolls. Preferably, there is a conceptual relationship between the interacting toys, for example "mother and baby" or "horse and rider", however, this is not required in all the preferred embodiments of the invention.

One aspect of some preferred embodiments of the present invention is related to toys which purposely transmit and receive signals between them. The signals may be part of a complex interaction involving many related signals, for example, confirmations, queries and replies. Alternatively or additionally, the signals may be simple two-part communications, for example toy "A" tells toy "B" to jump and in response toy "B" jumps and/or squeaks. In a preferred embodiment of the invention, the signals are transmitted directly between the toys. Alternatively or additionally, the toys are connected to a communications network. The network may have a star topology, for example, with at least some of the toys transmitting signals through a hub (e.g., a computer). Alternatively or additionally, the topology may allow

toys to forward signals from one toy to the next. In a preferred embodiment of the invention, a signal generated by a toy is intended for a destination toy and may include an indication of that destination toy. Alternatively or additionally, the signals may be multi-cast. Alternatively or additionally, each toy may choose which signals to detect and or respond to.

Another aspect of some preferred embodiments of the invention relates to communication between toys using sounds. Alternatively or additionally to communications using RF; magnetic fields; variable signaling, preferably, low frequency, visible signaling such as by moving appendages; IR; and visible light, toys may communicate using acoustics. In a preferred embodiment of the invention, the sounds used for communications are incorporated in sounds used for play. In one example, one toy generates vocal output towards another toy (talking) and the other toy responds to the vocal output. In a preferred embodiment of the invention, the incorporation is by recognition of the characteristics of the play sound. Alternatively or additionally, the signal is overlaid on the sound as a modulation or appended to it, for example as a beep. Alternatively or additionally, the sounds are inaudible, for example being ultrasonic or infrasonic. Alternatively or additionally, the sounds are inadvertently created when the toy acts, for example, a stomping sound caused by the walking of a first toy may be detected by a second toy, as a signal to respond to.

Another aspect of some preferred embodiment of the invention relates to sets of toys that are designed to respond to each other. In a preferred embodiment of the invention, the set includes two, three four or even over 10 individual toys. In one example, such a set may include a mother goose and three goslings. When the mother goose quacks and starts walking, the goslings can also quack and start walking after the mother goose. In another example, the set includes a plurality of toy soldiers. Preferably, the soldiers are divided into two groups. Within each group the toys preferably act as a unit, e.g., advance in a synchronized manner. When a soldier from one unit "fires" at a soldier from a second unit, the second soldier preferably responds by shouting out and falling and or becoming inactive.

Another aspect of some preferred embodiments of the invention relates to allowing and generating un-predicted and or complex interactions between toys. In a preferred embodiment of the invention, each toy receives, transmits and or responds to signals using a relatively simple logic. However, since there are many toys, with many possible relative positions, relatively simple logic rules may exhibit seemingly complex behavior patterns. In the animal world, such behavior is exhibited by ants, where each ant is relatively simple, but the anthill as a whole exhibits very complex behavior.

An aspect of some preferred embodiments of the invention relates to facilitating interaction between remote players, via interacting toys. In one example, if a first player is

playing with two toys "A" and "B", and toy "A" talks to toy "B", a vocal response for toy "B" may be generated by a second player. In the example of the soldiers described above, one unit of soldiers may be controlled from a remote location, such as another room, possibly using a second player. The control may be exercised by the second player using a computer. Additionally or alternatively, the second player may interact with his toys and this interaction and/or its results being transmitted to the unit of soldiers. In one example, the transmission uses an Internet connection, so that the two players can even be on opposite sides of the world.

Another aspect of some preferred embodiments of the invention relates to simple and relatively cheap interactive toys. In a preferred embodiment of the invention, the toys are controlled using a simple micro-controller and communicate using acoustic waves. Such communication is generally significantly cheaper than RF or IR communications. Additionally, such communication does not require a meditating computer, in accordance with some preferred embodiments of the invention, so that software and/or hardware installation on a computer is not required.

## BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more clearly understood with reference to the following detailed descriptions of non-limiting preferred embodiments of the invention in which:

Fig. 1 is a schematic block diagram of two interacting toys, in accordance with a preferred embodiment of the invention;

Fig. 2 is a schematic illustration of a mother goose and goslings toy kit, in accordance with a preferred embodiment of the invention;

Fig. 3 is a schematic block diagram of an individual interactive toy figure, in accordance with a preferred embodiment of the invention;

Fig. 4A is a schematic block diagram illustrating two interactive toys, wherein one of the toys is at least partially controlled from a remote location;

Fig. 4B is a schematic illustration of a soldier toy kit comprising two units of soldiers, a tank and an optional command console, in accordance with a preferred embodiment of the invention;

Fig. 5 is a schematic block diagram of a network configuration for toy interconnection, in accordance with a preferred embodiment of the invention;

Fig. 6 is a schematic block diagram of a communications tap for a computer, in accordance with a preferred embodiment of the invention; and

Fig. 7 is a schematic block diagram of a toy network utilizing a central broadcasting station, in accordance with a preferred embodiment of the invention.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1 is a schematic block diagram of two interacting toys, in accordance with a preferred embodiment of the invention. A toy 20 generates a signal which is detected by a toy 22. Toy 22 generates a response 26, back to toy 20. Toy 20 may then generate a further signal, in response to detecting or not detecting response 26. Additionally or alternatively, toy 22 generates a response 28 which is not directed towards toy 20. In a preferred embodiment of the invention, each of toys 20 and 22 comprise individual toys, for example, action figures, dolls, plastic animals and/or toy soldiers. In some preferred embodiments of the invention, the individual toys may be physically coupled together, for example, a plurality of action figures are all coupled to a base plate.

In a preferred embodiment of the invention, signal 24 comprises an acoustic signal. Such a signal may be audible or inaudible, for example being ultrasonic or infrasonic. Additionally or alternatively, the signals may comprise IR, RF, low frequency magnetic fields and/or electrostatic fields. Additionally or alternatively, signal 24 may be a passive signal and/or response to a probe by toy 22, for example an RF probe wave, which is responded to by a frequency doubling.

PCT application PCT IL98/00450, titled "The Control of Toys and Devices by Sounds", filed September 16, 1998, in the Israeli receiving office, the disclosure of which is incorporated herein by reference, describes sound actuated toys. In particular, the application describes various sound makers which generate sounds inadvertently as a result of motion, for example beads in a box or crinkle material. In a preferred embodiment of the invention, such a sound maker is connected to and/or mounted on toy 20, so that when toy 20 moves a signal will be generated for toy 22. This PCT application also describes detecting the direction and/or position of a sound, using directional microphones and/or a stereophonic microphone including two or more microphone elements. Additionally or alternatively, a relative distance is determined based on an amplitude of the sound.

In a preferred embodiment of the invention, the sounds (or other signals) are automatically generated by toy 20, for example on a random- or a periodic- basis. Additionally or alternatively, the sounds may be caused by a player, for example by a player activating toy 20.

In a preferred embodiment of the invention, toy 20 comprises a "mama doll" and toy 22 comprises a "baby doll". In a conventional scenario, a child will hold one doll in each hand and generate pretend conversation between them. In a preferred embodiment of the invention, each doll generates conversation sentences in response to conversation sentences uttered by the other doll. The conversation may be initiated by pressing a button on one doll, by their

proximity and/or by them being oriented to face each other. In a preferred embodiment of the invention, proximity is detected if one or both toys include a magnetic field generator, such as a magnet, and the other toy includes a switch which is activated by a change in magnetic field. Additionally or alternatively, proximity is detected by a metal part of one toy affecting a resonance circuit in the other toy.

Signal 24 is not limited to acoustic signal. In a preferred embodiment of the invention, the signal (and/or the responses) may comprise control of acoustic signal amplitude and/or frequency, motion, rotation and/or modification of motion and/or rotation of the toy, its appendages or other parts thereof and/or control of illumination, such as blinking of lights.

In a preferred embodiment of the invention, a simple signal-response logic is sufficient, for example a mother cow toy moos and a toy calf doll moves towards the mother. However, in some preferred embodiments of the invention, a more complex logic is provided. Such logic may include one or more of, differentiation between different signals, multiple response, different operations modes and/or states, possibly switched between based on received signals, time duration and response times, detection of responses to a signal, detection of various characteristics of the environment, including number of participating toys and/or absolute and/or relative position and/or orientation and/or distance between the toys.

In a preferred embodiment of the invention, the response is time limited, for example a motion in response to a signal may be limited to 5 seconds and/or to a duration depending on the signal.

In a preferred embodiment of the invention, the logic is implemented by circuits in the toys. Additionally or alternatively, the toys each include a transmitter and/or a receiver and the logic is at least partially if not fully implemented on a computer which communicates with the toys. Alternatively or additionally, other computation requirements of the toys, for example speech signal generation and/or display generation may be performed at the computer and transmitted to a toy for display (visual or acoustic).

In a preferred embodiment of the invention, the detection of a signal by a toy comprises a binary detection of the signal, e.g., an on/off state. Additionally or alternatively, more complex signal detection may be implemented, for example, detection of signal amplitude, frequency, frequency spectrum, Doppler shift, change in amplitude and/or duration, detection of a number of repetitions, voice and/or other pattern recognition in the sound, detecting patters of motion, for example gestures and/or detection of codes, for example in a flashing light source. Thus, the transmitted signal may include information about the sending toy's activities, location, environment, nearby toys, locally sensed information, logic state and/or readiness.

Such signal detection and or analysis may also be performed on a computer which is in communication with the toys. The physical detection circuit is preferably located on the toy. Additionally or alternatively, the detection circuit is also located on the computer.

Fig. 2 is a schematic illustration of a mother goose and goslings toy kit, which includes a goose 30 and a plurality of goslings 32, in accordance with a preferred embodiment of the invention. In a preferred embodiment of the invention, goose 30 includes a signal generator, for example a sound generator 34. The sound generator may be activated randomly, when activated by a player and or as a result of goose 30 moving or being squeezed. In a preferred embodiment of the invention, generator 34 is integrated into the legs of the goose so that a "stomping" sound is generated when the goose makes a step. Additionally or alternatively, the sound may be a periodic and or random "quacking" sound. In a preferred embodiment of the invention, each of goslings 32 includes a sound detector 36. Preferably, the sound detector detects the sound (or other signal) generated by the goose and causes gosling 32 to respond. One possible response is a "quack". Additionally or alternatively, the gosling moves towards the mother goose. Preferably, each gosling includes a sound generator 38, for other goslings to follow. Additionally or alternatively, all the goslings follow the mother goose.

In a preferred embodiment of the invention, sound detector 36 comprises a directional microphone, for example a stereophonic microphone or a microphone in which the frequency response is spatially non-uniform. In a preferred embodiment of the invention, a plurality of microphones are provided on each toy, so that holding the toy will be unlikely to cover all the microphones and deafen the toy. Additionally or alternatively, the microphones are located in hard-to-obstruct locations.

In an alternative preferred embodiment of the invention, the toys comprise puppy dolls, possibly with a mother puppy. In a preferred embodiment of the invention, when one puppy detects that a child is near, for example based on a crinkling bracelet worn by the child, the puppy signals to all the other puppies, for example by barking, and the other puppies approach the child, escape from it, start running in circles and or otherwise respond to the child.

Fig. 3 is a schematic block diagram of an individual interactive toy figure 40, in accordance with a preferred embodiment of the invention. Toy 40 preferably includes a receiver 42 which receives a signal from another toy. The signal is preferably analyzed by an analyzer 44, to decide on desired responses. An actuator 48 may be used to control one or more motors 46 and or to send a signal via a transmitter 50. Additionally or alternatively, an acoustic and or optical response may be generated. Additionally or alternatively, a message may be displayed on a screen which forms part of toy 40.

In a preferred embodiment of the invention, analyzer 44 and actuator 44 are embodied as a micro-controller. In a preferred embodiment of the invention, receiver 42 and transmitter 50 are embedded as piezoelectric acoustic elements, possibly as a single element. In a preferred embodiment of the invention, the output of receiver 42 is amplified to TTL levels and connected directly into one or more data lines of the micro-controller, for analysis. Thus, a high acoustic frequency can be detected and/or analyzed, without requiring an A/D. Preferably, the signal is amplified by various amounts, such as multiples of two of each other and connected in parallel to a plurality of data legs, so that multi-level signal detection is facilitated.

In a preferred embodiment of the invention, a toy kit includes a "dog" figure and a plurality of "sheep" figures. The dog figure moves in the direction of the sheep figures and causes the sheep figures to huddle up and/or move in a particular direction. In a preferred embodiment of the invention, the dog figure includes a memory so that it can track positions from which it "barked" at the sheep figures and/or to store the locations of a plurality of sheep. Preferably, the dog and/or the sheep include a position detection circuit, for example, by detecting a signal transmitted by a base station, for example incorporated in a barn. Additionally or alternatively, the dog includes a relative motion sensor, for calculating its current position, for example based on motion of wheels of the dog.

In a preferred embodiment of the invention, a plurality of "ant" figures are provided. In a preferred embodiment of the invention, the ants include a proximity detector, so that they can exhibit different behavior if they are near each other or if they are far away from each other, for example whether or not to follow other ants. In a preferred embodiment of the invention, the proximity detection is based on magnetic fields, for example DC magnetic fields or low frequency and/or pulsed magnetic fields. Such fields are generated by a rotating magnet, in accordance with some preferred embodiments of the invention.

In a preferred embodiment of the invention, individual toys may be programmed to specifically respond and/or interact with other specific toys. Additionally or alternatively, the toys may be programmed so that there is an order between the toys, at least an indication of a "leader" toy. In one example, each toy transmits and/or receives at a different frequency band. Additionally or alternatively, each toy transmits and/or receives at a different time delay after detecting a sound. Thus for example in the mother goose embodiment, each gosling may quack back at a different delay after the mother goose quacks. Each gosling may also be programmed to follow a gosling which quacks at a particular delay after the mother goose (0 delay if it is the lead gosling).

Fig. 4A is a schematic block diagram illustrating two interactive toys, a toy 60 and a toy 62, where one or more toys 62 are at least partially controlled from a remote controller 64. In a preferred embodiment of the invention, controller 64 directly controls a signal generated by toy 62 and or its response to a signal generated by toy 60. Additionally or alternatively, the control may be more subtle, for example, changing a mode of operation of toy 62. Additionally or alternatively, control may be exerted by controller 64 directly generating a signal to toy 60 and or directly generating a response to a signal from toy 60.

Several dimensions of control are preferably differentiated by all or part of the following analysis:

(a) Is the controller a human, a computer, or a predetermined sequence, such as a tape recording?

(b) Is the control over all aspects controllable features of the toy or only over some aspects, possibly a single one?

(c) How do the type, extent, amount and or other characteristics of the control vary over time and or as a function of interaction between the toys, where such characteristics may vary or remain constant?

(d) Is the control form a nearby location, a line of sight location, a next room or possibly a different city or country?

In a preferred embodiment of the invention, toy 62 includes a remote control, for example a radio remote control. Additionally or alternatively, toy 62 responds to commands from a computer and or transmissions responsive to a broadcast or a recorded tape. Additionally or alternatively, toy 62 is activated by a player's voice and or movements.

In a preferred embodiment of the invention, the signals transmitted from toy 62 to toy 60 comprises a command from controller 64.

In a preferred embodiment of the invention, a human player controls toy 62 using a signal generator attached to the player. Such a generator may comprise a bracelet which crinkles. Additionally or alternatively, the generator may comprise a magnetic bracelet. In a preferred embodiment of the invention, toy 62 can detect the relative position and or orientation of the bracelet and or motions thereof. In a preferred embodiment of the invention, such detected locations and or orientations may be used to control an interactive computer game, such as boxing, baseball or golf, whereby hand motions of a computer character are controlled by the motion of the bracelet, a glove and or a sound maker (passive and or battery operated) mounted on a play implement such as a bat or a club.

In a preferred embodiment of the invention, an action figure responds to these motions in parallel to the computer game, either by directly receiving the motions or by receiving

suitable commands from the computer. One or more additional action figures may be controlled by the computer to exhibit the actions of other characters in the computer game.

In a preferred embodiment of the invention, toy 62 is controlled from a remote location. Preferably, signals to toy 62 are forwarded to the remote location. In one example, a child pretends that toy 60 is talking to toy 62. The sound made by toy 60 or by the child is transmitted to the remote location or is naturally audible at the remote location. The voice of toy 62 and/or actions thereof may be provided by a parent in another room or even in another city. In a preferred embodiment of the invention, toy 62 is semi-automatic, so the parent can decide who responds to toy 60, the parent or toy 62. Preferably, toy 62 delays its response until it is clear the parent will not respond. Additionally or alternatively, the toy is controlled via a switch on the remote control. Additionally or alternatively to a parent, the toy may be controlled and/or may represent a friend of the child, in a remote location, such as the friend's house. Preferably, the friend also has a toy which exhibits the behavior of toy 60. Additionally or alternatively, the friend can view a simulated behavior of toy 60 on a computer screen. Thus, the two children can play together without leaving home.

Fig. 4B is a schematic illustration of a soldier toy kit comprising two units of soldiers 70 and 72, each comprising a plurality of soldiers 71 and 73, an optional tank 74 and an optional command console 76, in accordance with a preferred embodiment of the invention.

In a preferred embodiment of the invention, the soldier toy kit allows an easy play with a large number of individual toys, for example as shown in Fig. 4B. In a preferred embodiment of the invention, each of the individual toys responds to actions and/or movements of the other toys, for example, a toy soldier 73 may repeat any command voiced by any of the other toy soldiers. Additionally or alternatively, the soldiers in a single unit may advance in a synchronized manner, for example all moving together or in a staggered manner. In a preferred embodiment of the invention, the soldiers are wheeled. Additionally or alternatively, the soldiers move using legs.

In a preferred embodiment of the invention, toys from one unit also respond to actions/signals from toys in the other unit. In one example, when tank 74 fires at a soldier 71, the soldier responds by falling and shouting out. Preferably, the soldier detects it is in range by the signal source (such as sound) on tank 74 being directional and soldier 71 being in the direction. In another example, when a soldier 73 moves a soldier 71 advances in response. A directional sound wave may be generated using a suitable wave guide. Additionally or alternatively, two sound sources may be activated in phase, so that they are received in phase substantially only along one line emanating form the sound sources. Alternatively or additionally, a relative orientation of a sound source may be determined using two

microphones on the toy. Additionally or alternatively, the sound may be conducted via a floor, with the microphones being acoustically coupled to the floor.

In a preferred embodiment of the invention, console 76 may be used to command individual toy soldiers or groups of toys. Additionally or alternatively, only some of the toys are commanded and those toys generate and transmit commands for the other toys. Additionally or alternatively to using a console, the control may be by voice commands of a player. Additionally or alternatively, the console may be used to provide remote commands, for example from a player in a different house. In a preferred embodiment of the invention, the console 76 includes a computer, for displaying the relative positions of the toys, their logic, their mode and/or their responses to a remote player or a local player. Additionally or alternatively, console 76 includes a camera for viewing the toys and transmitting their image to the remote location. Additionally or alternatively, console 76 includes a loudspeaker for sounding vocal commands from the remote location.

In a preferred embodiment of the invention, the toys (e.g., their action logic and/or their specificity) may be programmed by computer. Preferably, the programming is downloaded to the toys. Additionally or alternatively, the toys communicate with a computer to perform their logic, so at least for some cases game scenarios only the computer is reprogrammed. In a preferred embodiment of the invention, at the start of the play the computer interrogates all the toys, to determine which toys are actually in a playing field.

In a preferred embodiment of the invention, spatial angles between a sound source and a plurality of microphones are determined by analyzing phase differences at the microphones. Alternatively or additionally, other methods known in the art may be used. In a preferred embodiment of the invention, a relative location of a pulsing sound source and a plurality of microphones is determined by solving time of flight equations.

In a preferred embodiment of the invention, four microphones are used to determine a three-dimensional position. For a source at $r=(x,y,z)$ and a plurality "I" of microphones at $M_I=(x_I,y_I,z_I)$, the distances between the source and the microphones are $D_I = r-M_I$. The acoustic velocity, "c", may be known, for example based on a known velocity in air. Alternatively, it may be determined by measuring the time of flight between a sound source and a microphone having fixed and known relative locations. A difference between distances is preferably defined as $dD(i,j) = D_i - D_j = c*dt(i,j)$, where $dt(i,j)$ is defined as a difference between time of arrival at microphone $i$ and time of arrival at microphone $j$. For N microphones there are N-1 independent differences dD. In an optimal configuration, the four microphones located at vertexes of a tetrahedron may be used to determine the location of a source. From practical considerations, such an arrangement may not be possible. Preferably,

more than four microphones are used, so that a higher resistance to noise and/or a higher localization precision may be achieved. In a preferred embodiment of the invention, the three dimensional position is determined by numerically or analytically solving three equations of the form:

$dD=c*dt(i,j)=||r-M_i||-||r-M_j||$, where (i,j) is preferably selected to be (1,2), (2,3) and (3,4). However any other independent three pairs of microphones may be used.

Fig. 5 is a schematic block diagram of a network configuration for toy interconnection, in which each connecting line indicates a possible communication path, in accordance with a preferred embodiment of the invention. In a preferred embodiment of the invention, a toy 80 and a toy 82 can directly communicate. Additionally or alternatively, toy 82 and a toy 86 can communicate using an intermediary, for example a computer 84, to which both can communicate. Additionally or alternatively, toy 80 communicate with toy 86 using toy 82 as an intermediary. Preferably, signals from toy 80 include a designation of toy 86. Additionally or alternatively, all messages are multi-cast.

Additionally or alternatively, toy 82 communicates with a toy 90 by computer networking, such as a LAN or an Internet, by which toy 82 communicates with computer 84, which communicates with a computer 88, which communicates with toy 90. Additionally or alternatively, a single toy 86 may communicate with two computers, 84 and 88, possible transmitting messages from one to the other, being controlled by one or both and/or providing status reports to one or both.

In a preferred embodiment of the invention, the toys communicate via acoustic waves, audible or inaudible. Additionally or alternatively, the toys communicate using IR. Additionally or alternatively, the toys communicate using RF signals. Additionally or alternatively, the toys communicate using low frequency magnetic fields. Additionally or alternatively, the toys communicate by telephone, for example, one of the toys being connected to a telephone socket, a cellular phone and/or being in communication with a computer which is connected to such a telephone connection. Such a telephone connection may also be used for a modem dial-up connection and/or for an Internet connection. In a preferred embodiment of the invention, the toy is controllable by DTMF sounds generated by a telephone keyboard, to simplify communication hardware.

In a preferred embodiment of the invention, the signals generated by a toy are inadvertently generated, for example, sounds generated by a wheel rotating or an appendage flapping. Additionally or alternatively, the signals are included in a generated action, for example, a quack sounded by a toy, which may be modulated by a signal, a blinking light, whose blinking may be modified by the signal or a waving gesture which may be modified

and or its duration or amplitude changed, to convey a signal. Additionally or alternatively, the signals are determined by analyzing a response, for example differentiating between different sounds produced by a first toy to decide which sound to make in response. Additionally or alternatively, the signal may be additional to generated actions, for example, an extra beep after a "quack". Preferably, such additional signals are made as unobtrusive as possible, for example by being ultrasonic.

Fig. 6 is a schematic block diagram of a communications tap 102 for a computer 100, in accordance with a preferred embodiment of the invention. One problem with computer communication is setting up the hardware and software for communications. In the configuration of Fig. 6, a tap is preferably placed on communication line to an existing peripheral 104. Thus, a user may not be required to even access a back part of a computer, let alone a computer's inside. A toy 106 preferably sends and or receives signals from tap 102. Additionally or alternatively, toy 106 may use one tap for receiving and one for sending.

In a preferred embodiment of the invention, the tap is placed on a cable to a printer, a network cable, a camera cable and or a SCSI connection. Additionally or alternatively, the tap is placed on a serial cable, for example a mouse cable. Additionally or alternatively, the tap is placed on a modem line, for example on a telephone line or by plugging the tap into another telephone socket, to be received by the modem. Additionally or alternatively, the tap is placed on a game controller line. Additionally or alternatively, the tap is placed on a loudspeaker line. Additionally or alternatively, the tap is placed on a microphone line. Additionally or alternatively, the tap is placed on a display cable line.

In a preferred embodiment of the invention, the tap includes an electro-magnetic coupler, which can induce signals in a cable which passes through or near the tap. Additionally or alternatively, the tap can detect signals in the line and transmit them to toy 106. In a preferred embodiment of the invention, the signals are at a different carrier frequency and or signal frequency than the usual signals passed along the line. Additionally or alternatively, the signals travel in an opposite direction (input signals on an output line, such as a printer or output signals on an input line, such as a mouse). Additionally or alternatively, the signals encode data which is detected and removed from the data stream in the computer. Additionally or alternatively, the signals are asynchronic on a synchronic line. Additionally or alternatively, the signals are transmitted only when no signal is expected by the computer and or the peripheral.

In an alternative embodiment of the invention, a piezoelectric actuator or other vibrating element is connected to a mouse. The actuator causes the mouse to shake at an amplitude of one or two screen pixels or less and the shaking is detected by software in the

computer as signals from the toy. A return signal may be transmitted to a tap associated with the actuator, along the serial cable, with the signal preferably being coded to be recognized by the tap and/or ignored by the mouse.

In an alternative embodiment of the invention, toy 106 communicates with computer 100 using a speaker and a microphone of the computer. Preferably, toy 106 receives transmissions from the computer loudspeaker and/or sends signals to the computer microphone. Additionally or alternatively, signals are transmitted to toy 106 via the microphone and received via the loudspeaker, depending on whether the hardware supports such a reverse connection.

In an alternative embodiment of the invention, toy 106 sends signals to computer 102 using a tap which presses keys on a keyboard attached to computer 100. Preferably the key sued is a shift key. Additionally or alternatively, signals from the computer are detected by detecting illumination of LEDs on the keyboard, for example a "Num Lock" LED.

Additionally or alternatively, toy 106 utilizes a transducer which plugs into a parallel port, a serial port and/or is optically coupled or placed near an IR port. Preferably, the transducer is a pass through transducer, through which a printer and/or other peripherals may communicate normally with a computer.

In a preferred embodiment of the invention, the tap and/or transducer can automatically detect which type of cable is tapped/port is connected to. Preferably, such detection is by analyzing amplitude, frequency and/or synchronization of signals passing through the lines. Additionally or alternatively, the computer detects which line is tapped, by detecting particular inferences on that line. Alternatively or additionally, software on the computer sends test signals along the lines, to be detected by the tap.

In a preferred embodiment of the invention, suitable software is installed on computer 100. Preferably, the software is self installing. Preferably, the computer is not used for any other use while toy 106 is communicating with it. Additionally or alternatively, the software can differentiate between "regular" signals" and signals related to the tap. In one example, a provided keyboard driver may detected special codes and/or data sequences on the keyboard line and remove them from the received data, passing only the rest of the received data to an operating system of computer 100. Additionally or alternatively, a provided mouse driver may detect spurious and/or small mouse movements, and recognize them as being tap related signals. Additionally or alternatively, a printer driver can recognize data on the cable as not coming from the printer but from a tap. Additionally or alternatively, data sent to the tap is preferably sent as data which will be rejected or ignored by the peripheral. Alternatively or

additionally, to using a tap for communication with a toy, such a tap may be used to attach a peripheral to computer 100.

Fig. 7 is a schematic block diagram of a toy network utilizing a central broadcasting station 114, in accordance with a preferred embodiment of the invention. In a preferred embodiment of the invention, a toy 110 may be controlled by central broadcasting station 114. In a preferred embodiment of the invention, station 114 is a DAB (Digital Audio Broadcast). Additionally or alternatively, station 114 is a cable broadcast or and Internet broadcast. In a preferred embodiment of the invention, toy 110 comprises a quiz toy which receives the quiz questions from station 114 and interacts with a player. In a preferred embodiment of the invention, a second toy 112, possibly at a remote location is also controlled by the same or related broadcasting station. Thus, toys 110 and 112 may be operated in a synchronous manner, for example, both asking the same quiz questions or questions selected from a same question set, at the same time. In a preferred embodiment of the invention, the toys include a communication feedback to station 114, the feedback indicated by dotted lines in the figure. In a preferred embodiment of the invention, station 114 receives from the toys an indication of progress of the quiz, a number of correctly answered questions, an identification of the toy or its owner and or other information related to the particular quiz, a history of playing and or the player. In a preferred embodiment of the invention, station 114 broadcasts to the toys an indication of a winner of the quiz and or other statistical information relating to the plurality of players simultaneously playing the quiz. In one example, the name of the winner is broadcast. In another example, a signal is broadcast so that only the winner toy will say "I am the winner".

In a preferred embodiment of the invention, each toy comprises a receiver for receiving the DAB broadcast and decoding information stored thereon. Preferably, the feedback is provided by a telephone connection from the toy. Preferably the feedback connection is used only if the toy is the winner or in the case of other infrequent occasions, so as not to tie up telephone lines. Additionally or alternatively, the feedback is meditated by a computer with which the toy communicates.

Additionally or alternatively, in cable broadcasting embodiments, the feedback connection may be via cable modem. Additionally or alternatively, in Internet broadcasting methods, the feedback may be by e-mail or by TCP IP.

The present invention has been described in terms of preferred, non-limiting embodiments thereof. It should be understood that features described with respect to one embodiment may be used with other embodiments and that not all embodiments of the invention have all of the features shown in a particular figure. In particular, the scope of the

invention is not defined by the preferred embodiments but by the following claims. Section titles, where they appear are not to be construed in limiting subject matter described therein, rather section titles are meant only as an aid in browsing this specification. When used in the following claims, the terms "comprises", "comprising", "includes", "including" or the like means "including but not limited to".

# CLAIMS

1. A toy kit comprising:

a leader toy which generates acoustic signals; and

at least one following toy which receives the acoustic signals and utilizes the signals to follow movements of the leader toy.

2. A kit according to claim 1, wherein said at least one following toy comprises a plurality of following toys.

For the applicant,

Fenster & Co. Patent Attorneys

## ABSTRACT OF THE INVENTION

A plurality of individual toys, at least a first one of which generates acoustic signals and at least a second one of which receives acoustic signals. When the second toy receives acoustic signals from the first toy, it responds, for example, by generating a sound and/or controlling its motion. In a preferred embodiment of the invention, the toys flock and/or form a procession of toys which follow a leader toy, for example a mother goose and a plurality of following and preferably quacking goslings.

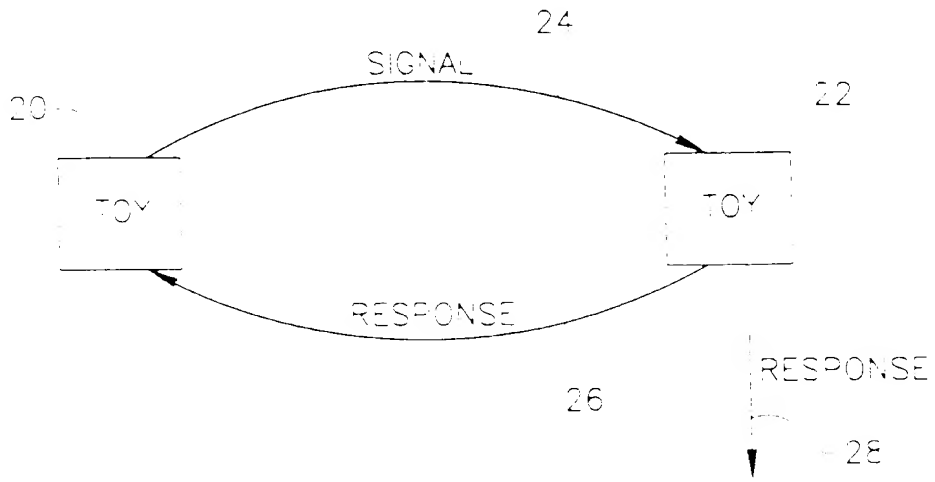


FIG. 1

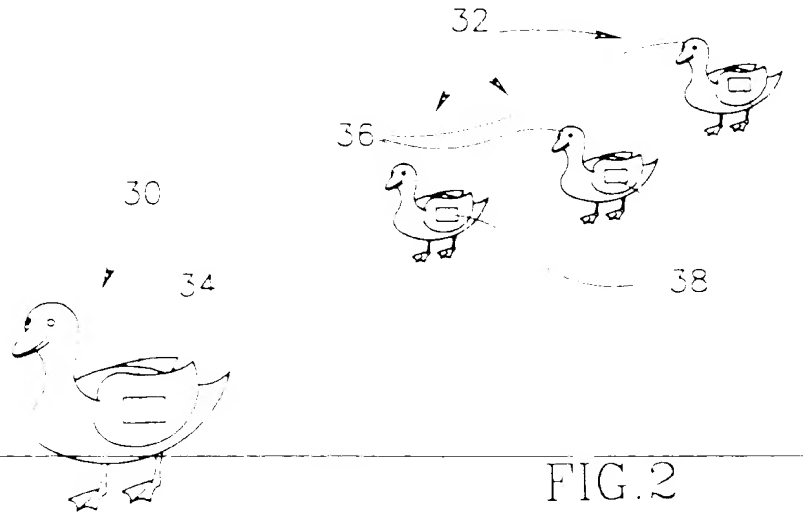


FIG. 2

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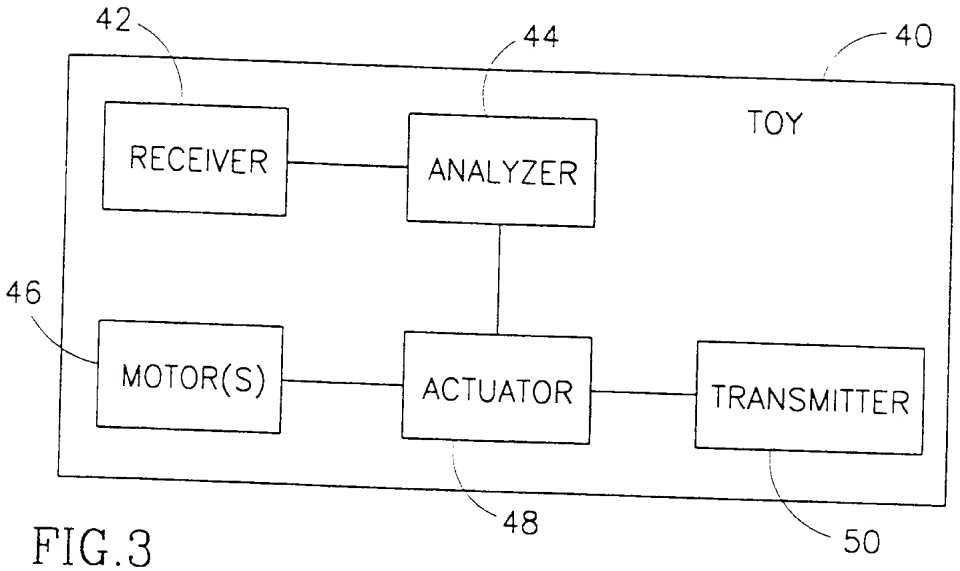


FIG.3

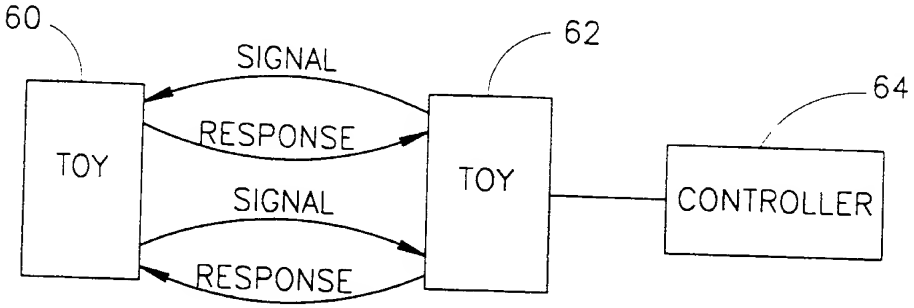


FIG.4A

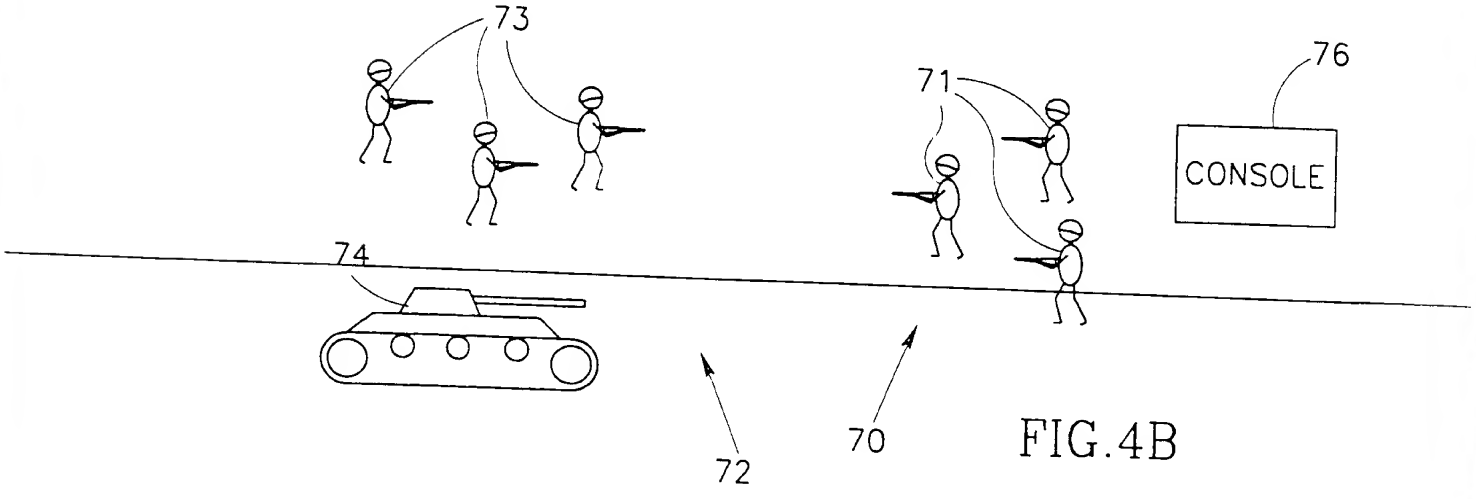


FIG.4B

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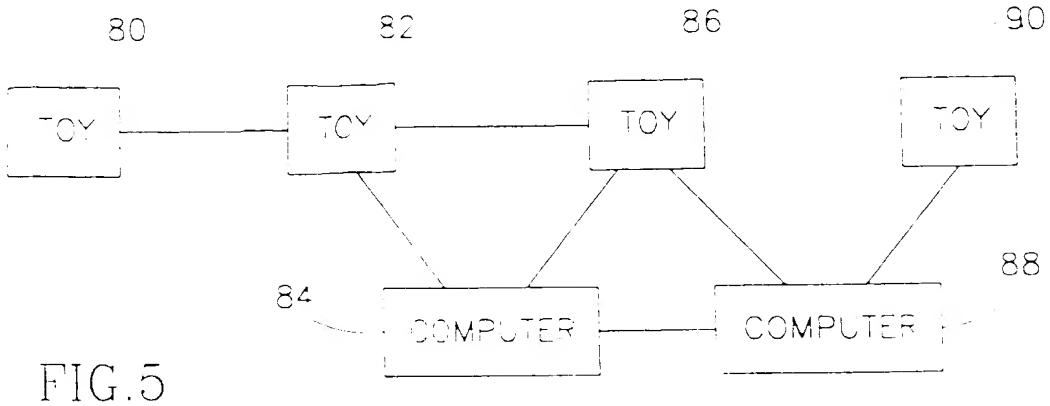


FIG.5

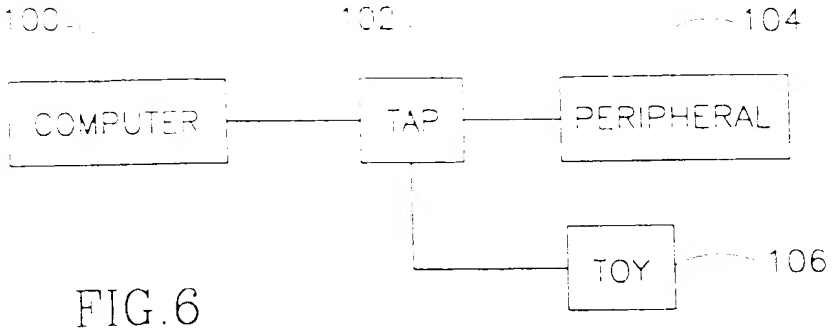


FIG.6

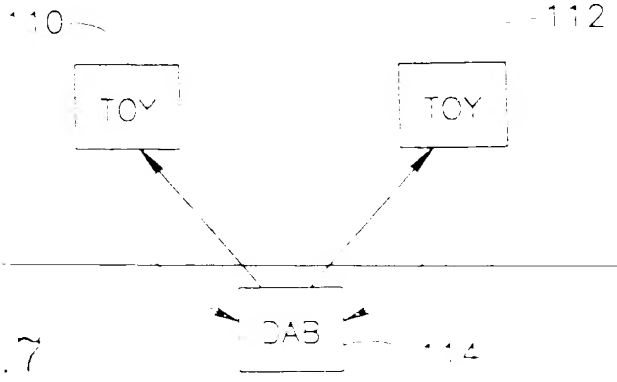


FIG.7